

REMARKS

Applicants' Amendment After Final filed 26 April 2004 was not entered. Accordingly, a Notice of Appeal and an RCE have been filed to maintain this application viable.

Support for the amendment to Claims 1, 3 and 9 can be found in Table 1, page 10, which shows use of polypropylene glycol (PPG)-based polyol and a polyisocyanate which is toluene diisocyanate (TDI) or 4,4'-diphenylmethane diisocyanate (MDI) and a free, or residual, diisocyanate level below about 0.6 wt%. Support for the amendment to Claims 5 and 11 can be found at page 8/4-15.

The present invention is directed to a non-solid polyurethane structural adhesive composition comprising (1) a controlled structure isocyanate terminated prepolymer composition, and (2) a curative for the isocyanate groups. The prepolymer composition is the prepolymer reaction product of a (PPG)-based polyol and a polyisocyanate which is TDI or MDI, and consists essentially of at least 80 wt% of a stoichiometric "perfect" prepolymer and contains less than about 0.6 wt% unreacted polyisocyanate monomer.

The advantages afforded by the claimed subject matter, include improved cured adhesive strength, improved ultimate adhesive strength, and improved ambient, or room temperature, development of strength. Examples 1 and 2 compare structural adhesives using prepolymer compositions shown in Table 1 prepared from PPG-based polyol and TDI or MDI and meeting the two defined criteria, namely the wt% perfect prepolymer and the wt% residual polyisocyanate monomer, with prepolymer compositions not meeting these requirements. These prepolymer compositions were compared in a structural adhesive composition containing the prepolymers of Table 1 and Arcol PPG 2025 and Quadrol curatives.

Table 2 shows that Prepolymer 5 according to the invention gave superior shear strength compared to Prepolymer 6 after room temperature curing and aging for one day and seven days as well as after heat cure and then room temperature aging for one day and seven days. Table 3 shows that structural adhesives containing Prepolymers 1 and 3 according to the invention showed faster room temperature development and strength after one day and superior % cure (1d/7d) than those adhesives containing Prepolymers 2 and 4 which are outside the claim language. Such an improvement in shear strength of the structural adhesives of the invention whether cured at room temperature or heat cured is

surprising and unexpected because it is not taught or suggested in any of the prior art and is of great value in structural adhesives.

In the Office Action mailed 23 December 2003, Claims 1-12 were rejected under 103(a) as being unpatentable over the Admitted Prior Art (APA) in view of US 5,880,167 (Krebs, et al.). Applicants submit that such 103(a) rejection is untenable in that the prior art as combined by the Examiner neither teaches nor suggests Applicants' claimed subject matter as a whole, namely, the defined non-solid structural adhesive manifesting the above-stated property advantages.

The APA is deficient with respect to any teaching or suggestion of a structural adhesive containing a curative and a polyurethane prepolymer reaction product that meets the limitations of amended Claim 1 and manifests the stated advantages.

The examples in the present Application show, with respect to PPG-based polyol/TDI or MDI prepolymers composing a structural adhesive, the need for the 80 wt% perfect prepolymers and the low free isocyanate monomer content to afford the surprising advantages of improved cured adhesive strength, improved ultimate adhesive strength, and improved ambient, or room temperature, development of strength. Such unexpected results are presented in the data in Tables 2 and 3 of the present Application.

The deficiency of APA with regard to teaching or suggesting the claimed subject matter as a whole, namely a structural adhesive comprising (1) the defined prepolymer composition having the required amount of perfect prepolymer and the limited amount of free diisocyanate monomer, in combination with (2) a curative for isocyanate groups, is not remedied by the Krebs reference. While Krebs teaches low free monomer content for environmental, health and safety reasons, there is nothing in Krebs with regard to the defined prepolymer having the combination of low free isocyanate monomer with the requisite amount of perfect prepolymer to afford the surprising advantages demonstrated for structural adhesives in Applicants' examples, i.e., the claimed subject matter as a whole.

Applicants have not just recognized another advantage "which would flow naturally from the teachings of the prior art". While a worker of ordinary skill in the art may find a suggestion to use low free isocyanate-containing prepolymer compositions for safety, health and environmental reasons, there is no direction to use such prepolymer compositions containing the defined amount of perfect prepolymers with curatives for isocyanate groups to

obtain structural adhesives manifesting the important and valuable advantages shown in Applicants' examples. Such differences are not obvious and are significant advantages not taught in the structural adhesive art.

In view of the above remarks, Applicants request reconsideration of this 103a rejection based on APA in view of Krebs and its withdrawal.

The Examiner's attention is directed to allowed co-pending U.S. Application 09/833,278 filed 12 April 2001 and its divisional U.S. Application 10/732,986 filed 11 December 2003. U.S. Appln '278 was published as U.S. 2003-0009049-A1 on 9 Jan 2003.

Believing the Application is in condition for allowance, Applicants solicit an action to that effect.

Respectfully submitted,

A handwritten signature in black ink, appearing to read 'Michael Leach', is written over the typed name.

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